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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

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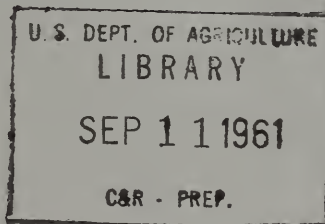
A N N U A L R E P O R T

ON

THE CONTROL OF WHITE PINE BLISTER RUST

IN CALIFORNIA

FOR THE CALENDAR YEAR 1960



U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CALIFORNIA REGION
1960

ANNUAL REPORT
ON
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THE SEASON IN BRIEF

The Forest Service of Region 5 furnishes leadership, technical direction, and coordination to the entire blister rust control program in California. This responsibility entails cooperation with numerous private owners, the State of California, and the National Park Service. Acting as an agent for the State, the Forest Service under a cooperative agreement conducts the control work on State and private lands and expends the State, private, and Federal funds allotted for this purpose. The Forest Service gives technical assistance to the National Park Service.

During 1960 blister rust control activities were conducted on selected stands of sugar pine in 19 counties extending from Siskiyou County in Northern California to Tulare County in central California. Work was done on numerous private holdings, 11 National Forests, 3 National Parks, 2 State Parks, and 2 State Forests.

Within California 648,800 acres of the better sugar pine stands have been selected for protection from white pine blister rust. Initial eradication has been completed on 84% of these lands. About 230,000 acres or 35% are in a maintenance condition and will require little further treatment.

The overall blister rust control program for California this year consisted primarily of the inspection of about 150,000 acres and ribes eradication treatment on almost 31,000 acres. Nearly 3.5 million ribes were destroyed in the process. The work was performed on National Forests and Parks, State Forests and Parks, and numerous private holdings. Eighty-five per cent of the premaintenance work was done under contract at an average bid price of \$7.74 per acre.

Surveys were made on 153,000 acres to determine compliance with contract specifications and for planning future work. As the result of past eradication work, an additional 20,653 acres were placed on maintenance in 1960. Active work in breeding rust-resistant sugar pine was continued and further progress was made in testing antibiotics for direct treatment of blister rust infection.

BLISTER RUST CONTROL POLICY REVISED

In 1958 the Forest Service recommended a modification of control policy for the Sierra Nevada south of the Merced River, embracing the Counties of Mariposa, Madera, Fresno, and Tulare. The policy consisted of deferring all initial ribes eradication and suppressing ribes populations elsewhere to ecologic levels aimed at the control of fruiting. The policy was to be reviewed periodically in light of new evidence and changed if necessary.

After a careful evaluation of all evidence a further revision in control policy was adopted in 1960. The new policy is:

1. Ribes eradication will be deferred in the Sierra Nevada south of the Merced River and the southern boundary of Yosemite National Park (embracing Mariposa, Madera, Fresno, and Tulare Counties) until such time as the presence of blister rust requires control action.
2. The standards of ribes suppression in Tuolumne, Calaveras, Amador, and Eldorado Counties will be determined by a careful reappraisal of local rust hazard. New standards resulting from such a reappraisal should substantially lower the level of control effort. These counties represent a transition zone between the area of deferred work to the south and the area of strict control to the north, a zone in which the degree of rust hazard is intermediate between the two areas.

This policy revision is based on two major considerations:

- a. Field observations, plot studies, laboratory tests, and rust behavior itself in the California environment over the last 16 years indicate that in the foreseeable future blister rust will not become a major pest in southern parts of the Sierra Nevada. The evidence is strong that blister rust has encountered limiting biologic and climatic factors in the central part of the State. This position is fully supported by the Division of Forest Disease Research, Pacific Southwest Forest and Range Experiment Station.
- b. A supplementary method of control permitting the saving of infected trees through the application of antibiotics, principally Acti-dione, is now being rapidly developed for sugar pine. Although this method may not be a substitute for ribes eradication, it holds great possibilities for saving stands that become infected and for gaining time until ribes can be suppressed.

Several implications of the recommended change in control policy should be made clear. Ribes eradication south of the Merced River is being deferred, not abandoned as a control method. It will be resumed, and selected stands will be protected if the rust should appear. The presence of the disease itself will dictate where and when control work shall be undertaken.

THE STATE COOPERATIVE AND NATIONAL FOREST PROJECT

The control of white pine blister rust on State and private lands in California is a cooperative project engaged in by the State of California, the Forest Service, and private timber owners. Under the terms of a cooperative agreement with the California Division of Forestry, the

Forest Service is responsible for the execution of the work. For this reason and because lands are often intermingled the State, private, and National Forest programs are administered as a single project by Forest personnel. Personnel of the California Division of Forestry and the Forest Service collaborate closely on program policies, project plans, and in working with private timberland owners.

The State of California assumes the full cost of the control work on State lands. The work on private lands is financed jointly by the State of California, Federal allocations, and contributions by private owners. Control work on lands administered by the Forest Service is financed entirely by Federal appropriations.

RIBES ERADICATION

Sugar pine management units comprise an area of 219,000 acres in State and private holdings and 267,000 acres administered by the Forest Service. Through additional pine delineation surveys the control acreage was increased by 6,000 acres of State and private lands and 3,000 acres of Federal land in 1960. The principal additions were in Tehama County and on the Lassen Forest. As the result of these changes the amount of initial work remaining shows little change. Initial eradication has been completed on 79% of the control area and 22% is in a maintenance condition.

During 1960 ribes were removed from 25,827 acres and 3,268,000 ribes were destroyed. As in former years much of the work was done on a contract basis. Contractors were plentiful and competition keen. The average bid price was \$7.58 per acre. Inmates from the Bear Creek Conservation Camp, Mt. Home State Forest, covered 335 acres by hand eradication methods and 28 acres by foliage application of a chemical herbicide.

ACTI-DIONE

Acti-dione, an antibiotic fungicide, has proved very effective in killing blister rust cankers in western white pine. When diluted in stove oil and applied to the base of the tree as a fine spray the solution penetrates the bark and kills cankers throughout the tree. Several million lethally infected western white pine have been treated and cured during the past few years.

The methods and formulations that have proved so successful on western white pine have given erratic results on sugar pine. For this reason a comprehensive program of testing different formulations of Acti-dione on sugar pine was begun in 1959 and continued through the 1960 season. During the two years 600 trees were treated in a series of test plots on the Klamath and Shasta-Trinity Forests.

The 1960 tests were made in July and August on the Klamath Forest and followed a plan developed by the Pacific Southwest Forest and Range Experiment Station. Staff assistance was provided by the Regional Office and the Klamath Forest Supervisor's office. Acti-dione was applied as a basal stem treatment in concentrations ranging from 200 ppm to 600 ppm.

The diluents used were #1 stove oil and diesel fuel. The results of the 1959 and 1960 tests will be evaluated in 1961. In addition other fungicides were tested on a small scale in 1960. They are Terraclor, Dowicide I, and Phyto babst L340, L341, and L342.

RUST-RESISTANT SUGAR PINE

Active work in breeding rust-resistant sugar pine is now in its fourth year. The work is part of the Region's tree improvement program carried on by Placerville Nursery personnel. The work consists of locating naturally resistant trees in heavily infected stands, selecting through controlled cross-pollinations those which will best transmit the resistance to their progeny and finally establishing seed production areas for the production of rust-resistant trees

Results of the work to date are:

1. Candidate trees.

Ninety-five sugar pines that appear to be rust-resistant have been located. About 20 of these candidate trees are in or near the cone producing age. The ultimate goal is to find 100 to 150 trees in this age class. The trees are located on the following Forests:

Klamath	-	75	Six Rivers	-	6
Shasta-Trinity	-	11	Plumas	-	3.

2. Grafting.

To ensure against the loss of germ plasm, each rust-resistant tree is being multiplied through grafting with a minimum of 10 grafts of each candidate. The success in grafting sugar pine has been erratic, some trees graft readily, other trees do not. To date 1,770 grafts have been tried and successful grafts have been established from approximately one half of the candidate trees.

3. Controlled cross-pollination.

Controlled cross-pollination of rust-resistant candidates was begun in 1959. The first seed from this work was collected in 1960. The seedlings resulting from this seed will be grown at the Placerville Nursery. The ability of the rust-resistant selections to transmit resistance to seedlings (F_1 progeny) will be done by exposing the seedlings to heavy natural infection at the Happy Camp outplanting site.

Controlled cross-pollination work was continued in 1960 and 26 different crosses were made. The success of this work cannot be determined until the cones mature in 1961.

4. Outplanting sites.

Two outplanting sites for growing grafted stock have been established. One site is near Happy Camp on the Klamath Forest. The second is at Badger Hill near Placerville, Eldorado Forest.

The Happy Camp site will be used for an archive plot, and as an area for testing the resistance of the grafted trees and the outplanted F_1 progeny. The Badger Hill site will be used as an archive plot and as a start of a seed producing area.

Where successful grafted stock has been established, 5 of these have been planted at each outplanting site. In 1960, 146 grafts were planted at the Happy Camp site and 116 at Badger Hill. In 1961, additional grafted stock will be planted at both sites.

THE NATIONAL PARK PROJECT

Blister rust control operations are conducted on all of the National Parks in California. Present protection units include about 160,000 acres and contain outstanding stands of foxtail, western white, whitebark, and sugar pine. The project is a cooperative activity in which actual control work is performed by the National Park Service while technical direction is provided by the Forest Service.

In 1960 work was performed on all three Parks. Nearly 5,000 acres received eradication treatment and 23,000 acres were surveyed to determine the need for work or the effectiveness of newly performed treatment. The bulk of the work was reeradication or maintenance and most was performed by hired technicians. Private contractors completed work on 430 acres.

About 5,000 acres of Park land were added to maintenance status during the year. This brings to 76% the proportion of control area now in this category. Virtually all control area has received initial treatment and most is in a near maintenance status.

LASSEN VOLCANIC NATIONAL PARK

Initial coverage of the Juniper Lake unit was completed this year. This completes for the present all initial work in the Park. During the summer ribes surveys were made in the Devil's Kitchen and Terminal Geyser areas which are under consideration for blister rust protection. A program of extensive scouting for blister rust occurrence was carried out this year. In all a total of 72 miles of roads and streams was inspected for infection on ribes or pines. The survey did not disclose the presence of any significant infection.

YOSEMITE NATIONAL PARK

Work in Yosemite was concentrated in the Wawona and Chinquapin units. A 20-man crew consisting of half checker and half eradication completed 14,000 acres of ribes surveys and about 2,700 acres of ribes eradication work. Contractors worked an additional 230 acres.

The ribes surveys which covered a substantial part of these units revealed the need for considerably less eradication work than had been anticipated. Consequently most of the active control area south of the Merced River was treated during the summer. Most of this area is now in excellent shape and will require very little work in the future.

SEQUOIA AND KINGS CANYON NATIONAL PARKS

Work this year was limited to a single 8-man high country camp operating in the Rae Lakes unit. All initial ribes eradication in the Charlotte Lake-Bullfrog Lakes area was completed, and a pre-eradication survey was made of the Rae Lakes portion.

TABLE 1

STATUS OF RIBES ERADICATION IN CALIFORNIA AS OF DECEMBER 31, 1960

Ownership	Control Operation	Control Units		Status of Ribes Eradication			
		Total Acres	Acres Unworked	Net Acres by Workings			Acres on Maint.
				Initial	Reerad.	Maint. Work	
WORK DONE BY THE STATE COOPERATIVE PROJECT							
PRIVATE LAND	Mendocino (Glenn County)						
	Klamath (Siskiyou County)	2,300		2,300	3,974	2,147	2,300
	Shasta-Trinity (Siskiyou and Shasta Counties)	4,315	71	4,244	4,619		220
	Modoc (Siskiyou and Modoc Counties)	6,706	3,224	3,482			
	Lassen (Tehama, Butte, Plumas, and Shasta Counties)	101,836	22,916	78,920	88,808	1,407	51,093
	Plumas (Plumas, Butte, Yuba, and Sierra Counties)	25,296	3,130	22,166	42,529		
	Tahoe (Sierra, Nevada, and Placer Counties)	1,913		1,913	1,198		221
	Eldorado (Eldorado, Placer, and Amador Counties)	42,823	7,646	35,177	69,227		8,320
	Stanislaus (Calaveras and Tuolumne Counties)	8,112	316	7,796	19,030	20	2,418
	Sierra (Mariposa, Madera, and Fresno Counties)	14,422	1,285	13,137	12,009	66	620
	TOTAL	207,723	38,588	169,135	241,394	3,640	65,192
STATE LAND	Letour State Forest	2,355	172	2,183	1,829	41	674
	Blodgett Forest-Univ. of Calif.	940		940	2,859		
	D. L. Bliss-Emerald Bay State Parks	2,280	40	2,240			1,163
	Calaveras Big Trees State Park	5,073	814	4,259	10,230		3,061
	Mountain Home State Forest	878	130	748	395		
	TOTAL	11,526	1,156	10,370	15,313	41	4,898
TOTAL STATE AND PRIVATE		219,249	39,744	179,505	256,707	3,681	70,090
WORK DONE BY THE FOREST SERVICE							
NATIONAL FOREST LAND	Mendocino	7,850	6,703	1,147	1,040		
	Klamath	2,238		2,238	2,326	765	2,238
	Shasta-Trinity	12,083	1,118	10,965	4,939		321
	Modoc						
	Lassen	26,456	9,216	17,240	12,666	347	5,761
	Plumas	62,525	13,448	49,077	70,087	395	2,066
	Tahoe	20,138	1,083	19,055	15,376		2,549
	Eldorado	38,049	8,740	29,309	40,297	10	4,826
	Stanislaus	43,603	910	42,693	93,087	269	17,831
	Sierra	49,578	19,293	30,285	44,415	51	500
	Sequoia	4,974		4,974	3,609		560
	TOTAL	267,494	60,511	206,983	287,842	1,837	36,652
WORK DONE BY THE NATIONAL PARK SERVICE							
NATIONAL PARK LAND	Lassen Volcanic	25,784		25,784	27,825	2,633	23,204
	Yosemite	85,697	3,523	82,174	109,929	11,576	57,259
	Sequoia-Kings Canyon	50,576	2,400	48,176	59,661	8,322	42,667
	TOTAL	162,057	5,923	156,134	197,415	22,531	123,130
ALL WORK DONE IN CALIFORNIA							
ALL CONTROL OPERATIONS		648,800	106,178	542,622	741,964	28,049	229,872

TABLE 2
SUMMARY OF RIBES ERADICATION IN CALIFORNIA - 1960

Ownership	Control Operation	Acres Worked	Eradication Man Days	Thousands of Ribes Destroyed	Acres Surveyed	Contract Eradication		
						Acres Worked	Average Price Per Acre Paid to Contractor	
WORK DONE BY STATE COOPERATIVE PROJECT								
PRIVATE LAND	Klamath (Siskiyou County)	65	7	2	65			
	Shasta-Trinity (Siskiyou and Shasta Counties)	1,672	648	55	4,905	1,672	\$ 7.32	
	Modoc (Siskiyou and Modoc Counties)							
	Lassen (Tehama, Butte, Plumas, and Shasta Counties)	3,631	872	181	24,542	3,059	6.05	
	Plumas (Plumas, Butte, Yuba, and Sierra Counties)	1,187	660	187	14,548	1,187	10.28	
	Tahoe (Sierra, Nevada, and Placer Counties)	281	78	47	1,256	281	7.55	
	Eldorado (Eldorado, Placer, and Amador Counties)	1,388	508	219	5,222	1,388	4.36	
	Stanislaus (Calaveras and Tuolumne Counties)	721	259	124	1,066	721	8.97	
	Sierra (Mariposa, Madera, and Fresno Counties)	1,076	388	145	2,394	1,034	7.54	
STATE LAND	Latour State Forest							
	Blodgett Forest-Univ. of Calif.	66	6	1	166	66	6.24	
	D. L. Bliss-Emerald Bay State Parks				2,280			
	Calaveras Big Trees State Park	1,043	444	99	1,043			
	Mountain Home State Forest	363	280	72	40			
ALL WORK DONE BY THE STATE COOPERATIVE PROJECT		Initial	1,620	815	236			
		Reeradication	9,607	3,267	891			
		Maintenance	266	68	5			
		All	11,493	4,150	1,132			57,527
WORK DONE BY THE FOREST SERVICE								
NATIONAL FOREST LAND	Mendocino	10	8	1	1,075			
	Klamath							
	Shasta-Trinity	2,132	1,004	137	5,236	2,127	9.09	
	Modoc							
	Lassen	2,477	970	214	20,041	2,209	7.29	
	Plumas	1,838	1,517	899	19,627	1,826	10.38	
	Tahoe	2,002	612	206	5,584	2,002	7.35	
	Eldorado	1,166	196	110	4,834	1,166	4.21	
	Stanislaus	2,338	474	213	6,785	2,129	7.01	
	Sierra	2,235	784	310	8,093	2,235	8.84	
ALL WORK DONE BY THE FOREST SERVICE	Sequoia	136	98	46	1,526	128	13.28	
	Initial	5,237	3,123	1,162				
	Reeradication	8,853	2,509	972				
	Maintenance	244	31	2				
	All	14,334	5,663	2,136				72,801
WORK DONE BY THE NATIONAL PARK SERVICE								
NATIONAL PARK LAND	Lassen Volcanic	1,654	215	26	7,404	200	7.84	
	Yosemite	2,940	1,047	80	14,000	230	23.86	
	Sequoia-Kings Canyon	232	34	11	2,000			
ALL WORK DONE BY THE NATIONAL PARK SERVICE		Initial	272	76	20			
		Reeradication	1,617	485	68			
		Maintenance	2,937	735	29			
		All	4,826	1,296	117			
ALL WORK DONE IN CALIFORNIA								
ALL OWNERSHIPS ALL AGENCIES		Initial	7,129	4,014	1,418			
		Reeradication	20,077	6,261	1,931			
		Maintenance	3,447	834	36			
		All	30,653	11,109	3,385			

